Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Redevelopment of Spectrum to	)	ET Docket No. 92-9
Encourage Innovation in the	)	RM 8004
Use of New Telecommunications	)	RM 7981
Technologies	)	
	)	

COMMENTS OF
NATIONAL SPECTRUM MANAGERS ASSOCIATION
ON THE
FURTHER NOTICE OF PROPOSED RULEMAKING

NATIONAL SPECTRUM MANAGERS ASSOCIATION, INC.

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SUMMARY

The National Spectrum Managers Association (NSMA) is a voluntary association of individuals involved in the frequency coordination of terrestrial microwave and satellite earth stations. These comments from the NSMA, representing the frequency coordination community, address the potential impact of the Commission's proposals in its Further Notice of Proposed Rule Making in Docket No. 92-9 on existing and future fixed microwave systems in the bands proposed for reallocation. In addition, NSMA offers proposals designed to smoothly integrate displaced 2 GHz operations into the higher frequency bands which use the spectrum resource as effectively as possible.

NSMA's objective is to make the frequency coordination process more efficient and effective. In summary, we propose:

- Existing channelization plans in the 4, 6 and 11 GHz common carrier bands should be retained in order to minimize intersystem interference, continue the availability of wideband channels and effectively accommodate potential narrowband users.

- Existing operations in the 4, 6 and 11 GHz common carrier bands, and growth of those systems, using existing channel plans, should be permitted indefinitely.

- The prior frequency coordination process described in Section 21.100 (d) of the Commission's rules should be made applicable to both Part 21 and Part 94 users in all bands addressed by the FNPRM.

- Uniform rules controlling the use of Automatic Transmitter Power Control (ATPC) should be adopted for both common carrier and private fixed microwave users.

- The Commission should vigorously apply itself to negotiations with the NTIA to make government spectrum in the 1710-1850 MHz band available to users displaced from the 2 GHz bands.

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FURTHER NOTICE OF PROPOSED RULEMAKING

The National Spectrum Managers Association (NSMA) submits the following comments in response to the Commission's Further Notice of Proposed Rule Making (FNPRM) in ET Docket No. 92-9. The Commission proposes to reallocate five bands above 3 GHz to private and common carrier fixed microwave use on a co-primary basis and to prescribe additional technical standards to govern use of these bands. The Commission's stated purpose is to ensure that alternative frequencies will be available to licensees now operating in the 2 GHz band and to allow them to relocate to other fixed microwave bands with minimal disruptions to their operations.[1] These comments from NSMA representing the frequency coordination community address the potential impact of the Commission's proposals on existing and future fixed microwave systems in the bands proposed for relocation. In addition, NSMA offers proposals designed to smoothly integrate the displaced 2 GHz operations into the higher frequency bands in a way that will use the spectrum resource as effectively as possible.

The NSMA, established in 1984, is a voluntary association of individuals involved in the frequency coordination of terrestrial microwave and satellite earth stations. The role of the Association is to supplement the Commission's coordination rules with procedural and technical recommendations developed in an open industry forum of coordinators, licensees, and manufacturers. The NSMA's objective is to make the frequency coordination process more efficient and effective.

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[1]Further Notice of Proposed Rule Making, Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies (Emerging Technologies), ET Docket 92-9, FCC 92-357, Released September 4, 1992

Channel Plans

NSMA believes that careful development of microwave channel plans that will facilitate efficient spectrum utilization is important; appropriate channelization will enable optimal use of spectrum by a combination of wideband and narrowband systems. Any change in existing channel plans, which have influenced the evolution of the electromagnetic environment for many years, will create an increased potential for interference and complicate the frequency coordination process. This is particularly true in urban areas where substantial scattering from structures will increase the likelihood of interference if there is an overlap of channels caused by multiple frequency plans.

In order to supplement those narrowband channels already available to accommodate systems displaced from the 2 GHz band, there may be segments of the 4, 6, and 11 GHz common carrier microwave bands which are suitable for narrowband channelization. While the material below addresses possible accommodation of displaced 2 GHz users in the common carrier bands channelized for wideband use, the goal of efficient spectrum utilization would be served if the Commission were to establish rules that would encourage those seeking narrowband channels to look for available frequencies in those bands (e.g., 6, 10, and 18 GHz) which already have narrowband channelization plans that may better match their bandwidth needs. In those instances where the Commission determines that it is appropriate to establish narrowband plans for frequencies currently used by wideband systems, the rules should specify a plan which will ensure that as few wideband channels as possible are consumed supporting narrowband systems. This will result in the minimum impact on current and future wideband users. It is also important to note that the 1850-1990 MHz private band, currently of primary interest for potentially producing displaced incumbents, is channelized to accommodate only six 10 MHz channel pairs and five 5 MHz channel pairs. A study by Comsearch[2] of the Houston area indicated that nearly all 1850-1990 MHz incumbents in that vicinity could be re-accommodated in the upper 6 GHz band (6.525-6.875 GHz) without accounting for the possibility that some of those displaced might be served by media other then fixed microwave. It seems likely that extensive use of wideband systems by displaced 2 GHz narrowband users may be unnecessary.

The new channelization plans in the FNPRM might be appropriate if newly available frequency spectrum were being initially channelized. However, the 4, 6, and 11 GHz common carrier bands are already well developed and industry-standard channelization plans are closely followed. Should the new plans be adopted, all of the existing installations and their future growth would need to be grandfathered in order to avoid disruption of existing licensee operations. This base of facilities will be far greater than the future development in some of these bands, so adopting new channelization plans rather than

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[2]See Comsearch's Comments, Appendix B, filed June 8, 1992 in response to the Notice of Proposed Rule Making, Docket 92-9.

endorsing the existing industry-standard plans makes little sense. In addition, the coexistence of incompatible plans would increase interference opportunities among systems and decrease efficient use of the spectrum. NSMA recommends that the current industry-standard wideband channel plans be used as the foundation for any new narrowband channelization plans adopted by the Commission.

Specifically, adoption of the proposed Alcatel channel plans into the proposed rules would raise obvious concerns with spectral inefficiency. With a mix of narrow and wide band carrier frequencies utilizing the same spectrum, inefficiency becomes unavoidable and steps would have to be taken to minimize spectral waste. For example, in a highly RF congested locality an occasional 29.65 MHz T-Plan[3] frequency pair may be available for a new installation using the common carrier 6 GHz band. If a narrow band signal (5 MHz bandwidth) is licensed in the same segment of spectrum as a 29.65 MHz carrier, then nearly 25 MHz of spectrum could remain fallow.

To minimize this potential in the 6 GHz and 11 GHz common carrier bands, signals that occupy less bandwidth than the presently operating channel plans should be accommodated, where possible, by the "guard bands" at the upper and lower ends of the bands and in the center segments not used for wideband transmission.[4]

Where the guard band/band center spectrum is not available or technically feasible to use, a showing could be supplied with the application indicating why this spectrum is unsuitable. In some cases, use of a portion of a wideband channel may be justified, however, care must be taken that the applicant is authorized use of a wideband channel pair as close to the band edges as is practical. In any case, allocation of narrowband channels overlaid on existing wideband channels should occur only on a very limited basis.

The 4 GHz band is currently used with interleaved transmit and receive channels. The new channelization proposes change to a "high/low" configuration; this will increase the difficulty of frequency coordination by causing interference conflicts with both ends of an old path and potentially eliminating the availability of cross-polarization isolation between frequency pairs. Little new 4 GHz microwave should be anticipated because of coordination conflicts with the numerous receive only "C" band earth stations that are registered; therefore this band is likely to be of little use to narrowband users even if a channel plan to accommodate this use is adopted.

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[3]This channel plan is described in CCIR Recommendation 383-3, "Radio-Frequency Channel Arrangements, For Analogue Radio-Relay Systems With A Capacity Of 1800 Telephone Channels, Or The Equivalent, And Digital Radio-Relay Systems With A Capacity Of The Order of 140 MBits/s Operating In The 6 GHz Band"

[4]For example, two 5 MHz channel pairs, with the same offset as the currently authorized wideband channels, could be created in the 6GHz common carrier band by pairing 5925-5930 MHz with 6177-6182 MHz and 6168-6173 MHz with 6420-6425 MHz.

The 6 GHz band, which uses several frequency plans, should retain the current 29.65 MHz channel bandwidth. Revisions of the channel plans so that new assignments will fall on integer values will create an offset with incumbent users of between .2 and 2.2 MHz, increasing the interference levels, particularly between digital paths. In addition, cross-polarization isolation may be lost.

In addition to requiring grandfathering of existing paths and their growth plans on all common carrier wideband frequencies, carriers will need to be able to reuse decommissioned equipment on new paths. They may also extend systems with new paths that must match the existing frequency plan in order to avoid intrasystem interference at the junction stations.

Grandfathering

Grandfathering is mentioned throughout the body of the FNPRM, but there is no inclusion of grandfathering in the actual rule sections; this appears to be inappropriate. Without the "protection" of grandfathering provisions in the Rules, it will not be possible for a licensee to know what options are available. Use of the word 'grandfathered' without clear definition of its meaning leaves many questions unresolved. There are many conditions what presently exist for fixed licensees which are not specifically provided for in the proposed rules and which therefore would appear to be subject to being grandfathered. The Commission should adopt specific provisions, as suggested herin, to cover exising installations, growth channels and the addition of new stations to a route if grandfathering is necessitated by the adoption of new channel plans.

In the 4, 6, and 11 GHz common carrier Point-to-Point bands today, virtually all of the existing operations could require grandfathering due to the proposed requirements for channelization, bandwidth, or channel pairings. Without this provision in the Rules, a significant economic burden could be imposed on established licensees.

Over the years, existing activity has evolved in many different frequency plans and configurations to allow for maximum utilization of the spectrum. Therefore, the ability to operate and grow on currently authorized microwave channels and under existing bandwidth and loading requirements must be maintained and provided for in the Rules. This also must include the reality that currently authorized users may not always be able to use the transmit and receive frequency pairs as provided for in the proposed Rules.

The ability of licensees to add additional frequencies on existing paths must be permitted without regard to the proposed requirements for specific channel frequencies, loading, and channel pairings. This is

required to continue to allow a grandfathered path the same flexibility and operating parameters that currently exist. In the event that an operator of a grandfathered path discontinues operation on that path, it should be permitted to use the transmitter and or receiver on another path to ensure a return on its investment.

Growth Protection

Common carriers have historically secured future growth channels through the prior coordination process. This process has proven invaluable for establishing long range growth plans, particularly in frequency congested areas. If this capability is to be extended to the 6 GHz private microwave band, which will now be shared with common carriers, Part 21 frequency coordination procedures must be adopted in this band.

Section 21.100(d) (2) (x) authorized carriers to provide renewal notifications to other carriers within ten days of the end of a six-month period. The current FNPRM requests comments as to whether time limits for the reservation of growth channels, such as a six month reservation period,[5] should be established.

Construction and installation of Point-to-Point microwave paths usually involve many separate functions. A partial listing of these functions includes: path design and frequency coordination; site acquisition and engineering including zoning and other necessary local and FAA authorizations; equipment shelter and/or tower design, acquisition, and construction; and equipment purchase and installation. Each of these items has a cost associated with it. While the cost associated with equipment purchase and installation obviously is sensitive to the number of microwave channels utilized, virtually all of the other costs are fixed regardless of the number of channels installed. In order to demonstrate profitability, it may be necessary to amortize this large fixed cost over a number of individual radio channels. Often the justification for this substantial investment is based on projected traffic and revenue which can only be accommodated by expansion of the system. The ability to reserve channels as a part of this process is critical.

It would be a breach of the Rules to build multi-frequency systems just to protect growth requirements. Likewise, it is unrealistic to assume that a major investment would be made without the ability to protect the revenue generating portion of that investment. The opportunity for common carriers to protect growth frequencies and their investment in existing facilities must be continued.

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[5]at 30

Coordination

NSMA strongly supports the Commission's proposal to require both common carrier and private users of the 4, 6, 10 and 11 GHz common carrier bands to use Part 21 coordination procedures.[6] This process has worked well since it was instituted, allowing industry participants to resolve differences without requiring adjudication by the Commission.

As noted in the FNPRM, the standards used by private and common carrier users for calculation of predicted interference are converging. In addition, as noted below, NSMA and TIA have formed a joint committee to address technical issues raised in this proceeding, as suggested by the Commission.[7] In this regard, NSMA advocates convergence of both the interference standards toward a single computational methodology and convergence of the frequency coordination procedures used to assure interference avoidance toward those specified by the Commission in Section 21.100 (d) of the Rules.

The FNPRM proposes[8] to allow for the sharing of most frequency bands between Part 21 and Part 94 users. With the exception of the existing 6 GHz private band (6525-6875 MHz) and two halves of the 23 GHz band, the Commission proposes that all of the bands have prior frequency coordination conducted under the provisions of Section 21.100 (d) of the Rules as opposed to the self-evaluation presently conducted in the Part 94 bands. .

Because of the potential for increased utilization of these frequencies due to migration and band sharing, the prior frequency coordination process should also be implemented in the upper 6 GHz band to allow for a more uniform and equitable process.

The lack of a 30-day frequency coordination period in any band would give it a perceived advantage in implementation speed and could therefore cause carriers to use it excessively when other bands are technically more appropriate. It is clear to the NSMA that identical frequency coordination procedures must be followed in all bands shared by the same user groups.

Industry Committee

The Commission has encouraged fixed microwave users to form a committee to address the technical issues related to this Docket .[9] The National Spectrum Managers Association and the Telecommunications Industry Association have joined together to investigate and reach mutually

[6] at 30
[7] at 29
[8] at 30
[9] at 29

satisfactory conclusions regarding the many technical issues involved with coordination and frequency sharing requirements. This will include both the needs of the newly licensed users as well as the needs and requirements of existing users.

This joint Committee had its first meeting on October 29, 1992 and will continue to meet and evaluate the needs of all users in an effort to address technical issues and to maximize frequency sharing and utilization.

Regarding the Commission's invitation to consider comments by this Committee in the proceeding, at this early stage of deliberations it seems appropriate for participating parties to represent themselves on an individual basis.

Digital Termination System (DTS)

The FNPRM indicates that the Commission proposes to allow approximately 20 existing Point-to-Multipoint users of the 10 GHz band to remain on a grandfathered basis, even though spectrum in the 18.82-19.26 GHz band is available for DTS/DEMS use, in order not to disadvantage the small number of existing users.[10]

It is important that the specifics of the grandfathering be included in the Rules. NSMA agrees with the Commission and believes that the existing DEMS licensees should be able to continue to operate in accordance with their existing authorizations. They should be allowed to utilize existing nodal stations to communicate with user stations situated at any azimuth and at any elevation from the nodal station and should be permitted to apply for additional nodal stations anywhere within their authorized SMSA. In addition, the requirement for paths greater than 5 kilometers should not apply to grandfathered DEMS systems.

30 MHz vs. 29.65 MHz Separation on the 6 GHz Band

NSMA is concerned regarding the frequency separation for the proposed 30 MHz bandwidth channels in the 5925 to 6425 MHz band. The Commission has suggested using what the common carrier industry refers to as the T-Plan channels. However, this well-established frequency plan uses a 29.65 MHz spacing between adjacent channels; the Commission has 'rounded' this separation off to 30 MHz.

While on first evaluation this may appear to be a more orderly method of frequency assignment, a closer look indicates that the offset that will occur between existing users (those operating on the present

[10]at 18, Footnote 7

29.65 MHz T-Plan) and those operating on the proposed 30 MHz frequency assignments will start off at 200 kHz and increase to 2200 kHz. In addition to our other interference concerns, this added offset will result in spectral inefficiency because the assignment of adjacent channel stations may overlap to the extent noted above if each is operating on a different frequency plan. In those cases, the ability to clear potential interference through the use of cross-polarization may be lost.

To allow for most efficient use of this band, the proposed 30 MHz bandwidth channel frequencies should be changed to the 29.65 MHz spacing. Narrowband subdivisions of these channels, where necessary, may be produced by dividing the channel into equal parts; for example a 29.65 MHz wideband channel could produce three narrowband channels, each of slightly less than 10 MHz.

Automatic Transmitter Power Control

The NSMA agrees with the Commission's intent to permit the use of Automatic Transmitter Power Control (ATPC) under Parts 21 and 94 of its Rules. However, the proposed changes related to ATPC as detailed in the FNPRM are inadequate and confusing.

Three sections have been explicitly proposed for modification to permit ATPC: Section 21.710, Section 94.45 and Section 94.79. Two of these sections (21.710 and 94.79) deal with EIRP limits on short paths, while the other (94.45) states the conditions requiring modification of station authorization. None of these proposed rule changes reflects the current usage of ATPC systems.

ATPC systems are consistent with the Commission's policy of using minimum transmit power to maintain communications over a point-to-point link. In concept, the transmit power of an ATPC system is increased only when the associated receiver at the far end of the transmission path has detected a significant level of signal fading, usually 10 dB or more. Because such increases of power are rare on a well designed path, ATPC offers the advantage of reducing interference into other spectrum users when compared to a conventional fixed transmit power system.

ATPC also offers significant equipment related advantages, including reduced power consumption and longer component life. Because of these advantages, some equipment manufacturers have chosen to make ATPC a standard feature on their microwave equipment. An interference reduction advantage may not be needed in many cases where ATPC is now employed, however, increased spectum efficiency is increased.

NSMA has defined three transmit powers associated with an ATPC system to be used during the Part 21 coordination process. These transmit power definitions are:

Maximum Transmit Power - The transmit power that will not be exceeded at any time.
Nominal Transmit Power - The transmit power at which the system will operate in normal, unfaded conditions.
Coordinated Transmit Power - The transmit power selected by the ATPC system owner as the power to be used in calculating interference into other systems. In order to claim this power is less than the Maximum Transmit Power, certain restrictions on the time that this power is exceeded must be met.

According to current NSMA guidelines, the nominal transmit power may be selected to be any value below the maximum transmit power that the ATPC user desires; values within the 6 dB to 15 dB range below maximum power are typical. The coordinated power is restricted to be in the 0 dB to 10 dB range below maximum power, with 10 dB being the typical value selected.

The proposed modifications to Parts 21 and 94 mention 3 dB increases in EIRP in Sections 21.710 and 94.45. As discussed above, the EIRP of an ATPC system may change by much more than 3 dB as fading conditions are encountered. However, the maximum EIRP of an ATPC system (based on the maximum transmit power) would not change.

NSMA requests that the FCC modify the rules to allow for transmit power decreases below the maximum transmit power for ATPC systems if they are consistent with the operation specified during the coordination and licensing process. However, the various maximum limitations on transmit power, EIRP, field strength, or power flux density by frequency band (as currently contained in the rules) must be met when the ATPC system is at the maximum transmit power. This will allow for the current protection afforded by the rules, while acknowledging that ATPC systems can operate over a range of transmit powers.

In order to allow a claimed coordinated transmit power to be below the maximum transmit power, NSMA guidelines require that certain restrictions be met. In general terms, the time percentage that the transmit power will be above the coordinated power must be small enough to limit the interference degradation to other users in the vicinity to an insignificant amount. Due to the complexity of these restrictions, the NSMA feels that the Commission should allow industry associations (such as NSMA and TIA) to define appropriate procedures to be used in dealing with ATPC systems during interference analysis. This approach would be consistent with the approach to other interference related issues (see Section 21.100 (d) and Section 94.63(c) (2)).

The NSMA, in Attachment A, suggests changes to the rules to explicitly accommodate ATPC systems in Part 21 and Part 94.

Government Bands

This proceeding would open access to several common carrier bands by private users displaced from the emerging technologies bands near 2 GHz, promoting the concept of sharing among compatible spectrum users. NSMA supports this approach to achieving optimum spectrum utilization of the available frequency bands. This concept should be extended, where possible, to include appropriate government bands.

The Commission's continued efforts to negotiate with the NTIA to allow public use of theses bands is an important and worthwhile effort for two primary reasons. First, there are likely to be some situations in which 2 GHz band fixed microwave is the only economic communications alternative; providing access to spectrum in the 1710-1850 MHz government band will allow relocation of these private fixed 1850-1990 MHz incumbents, permitting more homogenous access to this band by emerging technology proponents. Second, as has been suggested in congressional proposals,[11] economies and spectrum efficiencies will accrue if both government and non-government users are able to share the same spectrum, especially if government users are able to take advantage of commercial offerings made possible by public access to government spectrum.

Conclusion

NSMA offers the suggestions contained herein to improve the efficiency of spectrum use and to facilitate its management by industry. We recognize the potential complexities of the Commission's undertaking and, given our interest in interference analysis and frequency coordination, we will continue to follow this proceeding with interest.

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[11]Most notably H.R. 531, the "Emerging Telecommunications Technologies Act of 1991" (the Dingell Bill) and companion bill S 218.

Respectfully submitted,

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Appendix A

To Accommodate ATPC Systems
National Spectrum Managers Association
Proposes the Following Rules

Part 21 - Domestic Public Fixed Radio Services

Section 21.2 Definitions

* * * * *

Automatic Transmit Power Control. A technique used to increase transmit power only when fading has reduced the signal level into the associated receiver at the distant station by a specified amount. For systems using this technique, the maximum transmit power is the power that is not to be exceeded under any circumstance; the coordinated transmit power is the power, as defined by coordination association guidelines, to be applied in calculating interference into other systems.

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Section 21.100 Frequencies

* * * * *

(d) Frequency coordination.

(1) * * * *

(2) Coordination procedure guidelines

(i) * * * *

(ii) Notification must include relevant technical details of the proposal. At minimum, this should include as applicable, the following:

- Applicant's name.
- Transmitting station name.
- Transmitting station coordinates.
- Frequencies and polarizations to be added or changed.
- Transmitting equipment type, its stability, actual output power, emission designator, and type of modulation (loading). For transmitters employing automatic transmit power control, the maximum transmit output power, the coordinated transmit output power, and system operational parameters specified by industry guidelines shall be included.

* * * * *

Section 21.107 Transmitter Power

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(c) The power of each fixed power transmitter shall be maintained as near as practical to the power input or output specified in the instrument of station authorization.

(d) For automatic transmit power controlled systems, the transmitter power may vary during fading conditions as specified in the coordination process; however, the maximum power specified in the authorization shall not be exceeded. Unless explicitly stated otherwise, maximum limitations on field strength, ERP, power flux density, and transmit power in this Part shall be met when an automatic transmit power control system is at maximum power. Upon request from any interested party, applicants for systems using automatic transmit power control that claim an interference reduction advantage shall provide operating parameters and system features that ensure compliance to coordination association guidelines.

Part 94 - Private Operational-Fixed Microwave Service

Section 94.3 Definitions

* * * *

Automatic Transmit Power Control. A technique used to increase transmit power only when fading has reduced the signal level into the associated receiver at the distant station by a specified amount. For systems using this technique, the maximum transmit power is the power that is not to be exceeded under any circumstance; the coordinated transmit power is the power, as defined by industry guidelines, to be applied in calculating interference into other systems.

* * * *

Section 94.73 Power Limitations

(a) * * * *

(b) Transmitters employing automatic transmit power control should specify coordinated transmit power and maximum transmit power along with FCC Form 402. The transmit power of these systems may vary as specified during fading conditions; however, the maximum power specified in the authorization shall not be exceeded. Unless explicitly stated otherwise, maximum limitations on field strength, ERP, power flux density, and transmit power in this Part shall be met when an automatic transmit power control systems is at maximum power.